Objective Assessment of Imaging Methods

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Issue 1: Study Design

- Impact of prevalence
  - Esp. in studies in screening population
  - Power then strongly influenced by number of positives – $$$
- Impact of variation: decreases power
  - In prevalence across participating institutions
  - In accuracy across test interpreters

Issue 1: Study Design

- Addressing prevalence
  - Accrue until reach desired n_+ – per site? T+?
  - 2-phase designs: obtain GS on "all" T+, some T-
  - Hierarchical models, Bayesian methods
- Impact of variation
  - In prevalence: hierarchical, Bayesian
  - In accuracy across observers: extend mixed-effect ANOVA models for accuracy; HM, BM

Issue 2: Molecular and Functional Imaging

- Massive amounts of data
  - Quantitative
  - Noisy
  - Differs across modalities – e.g., PET SUV, MR spectra, etc.
  - What are the best summaries?
  - How much summarization and analysis are presented to the interpreter?

Issue 2: Molecular and Functional Imaging

- E.g., Analyzing spectra
  - Choosing important peaks/patterns
  - Decomposition: tissue components
- E.g., Best "SUV-type" measure?
- Relating results to response, prognosis
  - Incorporate covariates
  - Time dimension

High Priority Research Focus Areas

- Methods for study design
  - Hierarchical, Bayesian
  - Implications for analysis
- Methods for analyzing data from molecular and functional imaging
  - Specific to modalities
  - Emphasis on relating imaging results to response to therapy, prognosis